

**Patent number:** CN1251008  
**Publication date:** 2000-04-19  
**Inventor:** FANG ZHICHENG (CN)  
**Applicant:** HUAWEI TECH CO LTD (CN)  
**Classification:**  
**- International:** *H04B1/16; H04Q7/32; H04B1/16; H04Q7/32*; (IPC1-7):  
H04Q7/32; H04B1/16  
**- european:**  
**Application number:** CN19981021515 19981008  
**Priority number(s):** CN19981021515 19981008

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**Abstract of CN1251008**

The invention relates to a mobile telephone having radio function, including digit process unit, liquid crystal indicator, power source, keyboard earphone jack, reception circuit and circuit elements. The reception circuit and circuit elements. The reception circuit is connected with digit process unit, driving unit, power source and earphone jack by means of digit process unit, liquid crystal indicator, driving unit, power source and earphone jack. The advantages are: perfect keyboard input and interface indication, set frequency and voice value easily, select channel conveniently, and high intelligence.

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Laid open number: CN1251008A

Summary: This invention contains the following mobile phone with a kind of radio function. : CPU (201) (data-processing unit), LCD (102) (liquid crystal display), a power supply (205), a keyboard (106), an earphone (213), a radio circuit (214), and circuit main part.

A radio circuit borrows CPU (201) of a mobile phone, and LCD (102), amplifier (209), a power supply (205), and an earphone (213) are mutually connected with CPU (201), amplifier (209), and an earphone (213).

The input and interface of a keyboard On a display, a key and tuning can also be convenient at a setup, frequency and volume can be freely, used for a various use with one mobile phone with the high degree of intelligence, and the function as identity personal effects can fully be demonstrated.

#### Claim

1. A mobile phone with a kind of radio function comprising: CPU (201), LCD (102) A power supply (205), a keyboard (106), and amplifier (209), Earphone (213) wherein a radio circuit and a circuit main part are included.

2. The mobile phone with the radio function stated by the claim 1 wherein the amplifier and the earphone of the feature of are stereos.

3. The mobile phone with the radio function stated by the claim 1 wherein a radio circuit (214), CPU (201), amplifier (209), and an earphone (213) are connected each other.

4. The mobile phone with the radio function stated by the claim 1 wherein the radio circuit (214) uses for an antenna the shield line for the outdoors connected with the earphone, and receives a broadcasting station signal.

5. The mobile phone with the radio function stated by the claim 1 wherein a radio circuit (214) uses the voice amplification circuit of a mobile phone for voice amplification.

6. The mobile phone with the radio function stated by the claim 1 wherein a circuit main part uses FM (302), and a frequency output is controlled by CPU using a phase lock loop.

7. The mobile phone with the radio function stated by the claim 1 wherein a radio circuit (214). Frequency is controlled by CPU and realized in automatic tuning or a keyboard (106) input and volume is determined by amplifier (209), and it is electric adjustment and is controlled by CPU (201), and the control of a power supply uses an electronic switch and is CPU (201). It opens and closes.

this invention -- mobile communications -- it is a product and is specifically a kind of stock type mobile phone.

the present being certain a cellular phone LCD CPU transmission a machine DSP (digital signal processor) amplifier a buzzer a microphone a speaker an earphone a keyboard a SIM card and a power supply constituting having a user receiving calling entering etc. providing another time a display a number memory of the number etc. attachment a function having although others information a source it the purpose of this invention -- CPU of a mobile phone, a keyboard, and LCD amplifier, an earphone, and a power supply -- further -- a radio circuit -- one set of an addition and practical use -- intelligence-ized convenient FM radio -- the signal of a broadcasting station -- receiving -- many -- a function is demonstrated as identity personal effects with a use mobile phone

In order to attain the above-mentioned purpose, CPU, LCD, a power supply, a keyboard, amplifier, an earphone, a radio circuit, and a circuit main part are contained in the mobile phone equipped with the radio function of this invention. above-mentioned amplifier and an above-mentioned earphone -- a stereo -- it is connected to a radio circuit and CPU amplifier, an earphone.

A radio circuit uses as an antenna the shield line for the outdoors connected to the earphone, and receives a broadcasting station signal.

Moreover, the voice amplifier circuit of a mobile phone is used for the amplifier of radio.

In a circuit main part, an output controls an electronic abnormal-conditions machine by CPU using a phase lock loop.

The frequency of a radio circuit is controlled by CPU and realizes frequency by automatic tuning or the keystroke.

The amplifier in amplifier determines volume and it is controlled by electrical

machinery-adjustment by CPU.

A power supply is opened and closed by CPU using an electronic switch.

The radio circuit of this invention fully uses the related portion of the usual cellular phone, i.e., a keyboard, LCD and CPU, amplifier, an earphone, etc., and is

It reached with the perfect keyboard input and was set as a good interface display, frequency, or volume freedom, and tuning is convenient and correctness and the degree of intelligence are equipped with the strong point which the usual high radio does not have.

The mobile phone which has the radio function of this invention simultaneously provides a user with a new information channel, for example, the newspaper program at the time of rest, FM music, etc. fully demonstrate the pocket function of a move type telephone by secret-intention multiple use.

With reference to illustration, the concrete enforcement system of this invention is described still in detail below.

Block diagram figure 3 of the mobile phone in which block diagram figure 2 of a cellular phone usual in Fig. 1 has the radio function of this invention block diagram figure 5 of the radio circuit of this invention for connection figure figure 4 of the relative portions of the radio circuit of this invention, and a mobile phone The electronic abnormal-conditions machine of this invention,

In radio circuit diagram figure 7 of the example of this one invention, that is not the same with radio circuit power supply control circuit diagram figure 1 of one example of this invention as for principle figure figure 6 of a phase lock loop Fig. 2 A radio circuit [ circuit diagram figure 8 of the phase lock loop of one example radio circuit electronic abnormal-conditions machine of this invention ] (214) is added, and the circuit is controlled by direct CPU (201), and operates frequency setup, volume control, power supply control, etc.

B For a radio circuit (214), CPU (201), amplifier (209), an earphone (213), are connected each other.

As shown in Fig. 3, it connects with CPU with 4 leads, and a radio circuit (214) is connected with amplifier (209) with two leads.

One of them is connected with a left channel, and one [ another ] is connected with a right channel.

It is connected with an earphone through one lead again.

In CPU, one electric wire leads to power supply control of a radio circuit (214) independently.

Corresponding to this, the titles 1, 2, 3, and 4 in Fig. 8 are separately connected with four lines of a radio circuit (214) and CPU (201), and send a suitable signal.

M-LE is [ the continuation input of control data, a M-CLK leaf clock input, and M-LOCK of input latch enabler and M-DATA ] phase lock loops in it.

Fig. 8 of titles 5 and 6 is the connection line of a radio circuit (214) and an earphone (213) by the connection line of a radio circuit (214) and amplifier (209) in Fig. 6.

A title 7 is the connection line of a power supply control circuit (307) and CPU (201) in Fig. 7.

The earphone of amplifier (209) is a stereo similarly by right-and-left both channels to the amplifier of a cellular phone usual in the place different from amplifier (209) and the amplifier of the usual cellular phone being monochrome because of the stereo signal of a radio circuit.

Fig. 4 is a composition block diagram of a radio circuit (214).

The radio circuit consists of a filter (301 303), an electronic abnormal-conditions machine (302), amplification restriction amplifier (304), a frequency monitor (305), a decoder (306), mixer (308), etc.

As for the place different from the usual radio circuit, an electronic abnormal-conditions key is added, as for a radio circuit (214), as for a voice amplification portion, the voice amplification circuit of a mobile phone is used, and all of the high frequency of a radio circuit (214), a mixed cycle, an inside cycle, amplification restrictions, a frequency monitor, a stereo decoder, etc. are realized by one IC in fact.

The power supply (VFM) of the whole radio circuit is controlled by CPU (201), and when a radio circuit (213) is opened, as for the voltage (VBB) which came from the power supply (205), it provides passage radio with a power supply (VFM) directly in a power supply control circuit (307).

Moreover, if broadcast is not heard, the whole radio circuit will be turned off and a key will reduce consumption of a mobile phone.

A radio circuit (214) uses the earphone line of a mobile phone as an antenna, and receives the electric wave of a broadcasting station.

the signal received with the antenna should pass a radio circuit (214) -- it becomes irregular by the frequency monitor, after growing into a voice signal, it is inputted into amplifier (209), and it is amplified, and is further sent to an earphone (213)

As shown in Fig. 4, a concrete process B The antenna of an earphone It becomes an inside cycle signal by this signal frequency mixer (308) which was amplified and was generated with the electronic abnormal-conditions vessel (302). the broadcasting station signal received by the shield line as which it served should pass a buffer, after a filter (301) removes a band foreign news number -- Carry out buffer amplification again and restriction amplification is carried out with amplification restriction amplifier (304). pass a filter (303) -- The amplifier in which the signal which became a cycle while frequency changed, although the degree of amplification is in agreement, went into the frequency monitor (305), went into the back decoder (306) by which inspected frequency and buffer amplification was carried out further, turned into FM signal of a stereo sound, and was divided into right and left was shown in Fig. 2

It goes into (209) and is sent to an earphone (213).

An electronic abnormal-conditions machine (302) completes tuning operation, and this frequency which is different by channel which controls and is different by the phase lock loop with realization and CPU (201) is set up.

or [ that Fig. 5 was locked / data / of a phase lock / connection / by CPU by the frequency inputted then planned at CPU (201) in the phase lock loop circuit work principle figure of an electronic abnormal-conditions machine in control and CLK (clock), the DATA(frequency) LE (latch enabler) signal, the lock state (LOCK) of a phase lock loop, etc. ] -- it judges how it is

Phase lock loop book oscillating Sun Pullar frequency is built with the 9.6MHZ crystal which connected the phase lock loop book oscillating circuit outside, is further changed into the basic frequency of 75KHZ(s) inside a phase lock loop, and is sent to frequency mixer (308).

: in which a frequency setup of radio is divided into two stages -- the first step inputs frequency by the preset of a channel, an automatic search, or the keyboard first

The menu" radio function in which operation of an automatic search was displayed on the display of a mobile phone through the key,

After inputting into frequency setup and automatic search", a mobile phone starts a scan by 75KHZ(s) from the minimum frequency (88MHZ).

when the intensity of the received signal exceeds a critical value, a scan is suspended and it warns a user a cautions of whether urging -- if -- a user -- "negative" -- if a key is driven in, a scan will be continued, if it is a "check" key, an alternative sign will be required of a user, if it does, the frequency will be suspended, and a scan is begun again

Thus, it continues to the highest frequency (108MHZ) of FM office.

Suspension of all preset office frequency can be performed now.

If the frequency of an office is known, a direct input can be performed, and it will go into a menu" radio function, a frequency setup, and manual", and will input an input and a frequency substitution sign for frequency first.

B This frequency is suspended now into a telephone.

This alternative sign turns into an alternative sign of an office from now on.

If broadcast is heard and a key and the alternative sign of the preset(ed) office will be selected, it is good in the second step.

Concrete operation goes into a menu" radio function and tuning", and carries out the alternative sign of an office, or tunes in through a lower key a top.

Since the output of an earphone is used when hearing broadcast of a radio station, it is not necessary to repeat adjustment about a setup of volume at the time of listening.

The setting method of volume chooses a setup of telephone call volume, and similar :, i.e., "system setup / volume control / menu, and adjusts it by the up-and-down key.

A radio circuit (214) is usually in a stop state.

After CPU (201) attaches the power switch of a radio circuit and sets up frequency, a radio circuit starts.

Since a private use of the throughput of CPU is not made during the work by which the radio circuit was stabilized, a mobile phone can still be called, and can receive a signal and a user's attention is urged to it at a buzzer.

When there is a call, if it goes ahead with a telephone call by the earphone, although a broadcast signal and a partner's telephone call signal may overlap, as for a key, a user may need such situations.

For example, it is the case where broadcast music is set to BGM etc.

What is necessary is to hear a partner's talk only with a speaker or just to cut the output of the radio amplifier circuit portion in amplifier through key operation to remove such situations.

Fig. 6, Fig. 7, and Fig. 8 explain the concrete example of this invention.

For CXA1238SIC and 2, as for an abnormal-conditions amplification circuit and 4, a VCO circuit and 3 are [ one in it / the digital modulation control ICMB1504 and 5 ] the PCMOs pipes MTD2955.

Fig. 6 is the radio circuit of one example of this invention.

It corresponds with Fig. 3, and in CXA1238SIC of SONY company production, this circuit performs all functions, such as reception, decoding, high frequency amplification, frequency mixing, inside cycle amplification, amplification restriction amplifier and a frequency monitor, and a stereo decoder, and is high sensitivity, low noise, low distortion, and power saving.

Frequency transmitter RF-IN carries out input amplification by two channels, R and L, with a CXA1238S abnormal-conditions output at amplifier (209) according to induction of the shield line of an earphone outside, and is inputted into an earphone.

The VCO circuit which consisted of parts of the voltage control variable condenser two-poles pipe VD2 and VD3 grade offers this signal, an abnormal-conditions amplification circuit also consists of parts of the voltage control variable condenser two-poles pipe VD4 and VD5 grade simultaneously, and the control signal VT comes from MB1504 of a phase lock loop.

Fig. 6 is the electronic abnormal-conditions machine phase lock loop circuit of one example of this invention.

B -- this circuit -- MB1504 of a FUJITSU company -- the data abnormal-conditions control IC -- carrying out -- use

This IC is a low voltage and low consumption by the single phase lock loop (PLL). The signal the FMOSC signal formed after the buffer

The signal and phase comparison which sent to the phase comparison machine in the back phase lock loop divided into the frequency of phase lock loop sending 25KHZ, and were kicked 25 KHZs by 9.6MHZ signal for 2 minutes are performed. The error signal DO of an output the low cycle filter of a resistance capacitor circuit

After passing, it indicates whether became the direct-current control voltage VT, then controlled VCO (namely, 本振 circuit of radio circuit) oscillating frequency,

made output frequency of VCO the same with a schedule value, the output of phase lock loop signal M-LOCK was sent to CPU (201), and the phase lock loop was locked.

The frequency separation coefficient of the frequency separation coefficient of VCO signal frequency and the Sun Pullar frequency of a crystal Y2 controls a setup of a signal through M-LOCK, M-DATA, and M-LE from CPU (201).

MTD2955 closes VFM and the power supply control circuit (307) of this invention example does not offer current, when output signal M-PWR of CPU (201) is a high level, as it consists of one PCMOs pipe MTD2955 and was shown by CPU (201) are connected each other as shown in figure 7, but when M-PWR is a low level, MTD2955 leads, and provides VBB with current, and provides VFM with current in direct communication and the whole radio circuit.

Since concrete operation of frequency, a volume setup, etc. is as above-mentioned, it does not explain again here.

[19]中华人民共和国国家知识产权局

[51]Int. Cl<sup>7</sup>

H04Q 7/32

H04B 1/16

## [12] 发明专利申请公开说明书

[21] 申请号 98121515.7

[43]公开日 2000年4月19日

[11]公开号 CN 1251008A

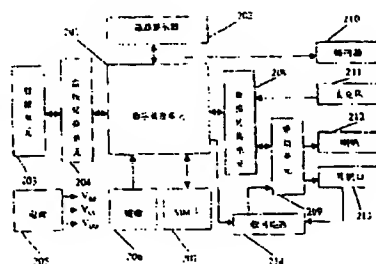
[22]申请日 1998.10.8 [21]申请号 98121515.7  
[71]申请人 深圳市华为技术有限公司  
地址 518057 广东省深圳市科技园科发路华为用  
服中心贾振勇转  
[72]发明人 方志成

权利要求书 2 页 说明书 6 页 附图页数 6 页

[54]发明名称 具有收音机功能的移动电话

[57]摘要

本发明涉及一种具有收音机功能的移动电话,包括数字处理单元(201)、液晶显示器(102)、电源(205)、键盘(106)、耳机口(213)、收音电路(214)及电路元件。收音电路(214)借用了移动电话的数字处理单元(201)、液晶显示器(102)、驱动单元(209)、电源(205)、耳机口(213),与数字处理单元(201)、驱动单元(209)、耳机口(213)相连。具有完备的键盘输入及界面显示,可灵活设置频率、音量,选台方便、智能化程度高,使移动电话一物多用,充分发挥了其作为随身携带品的功效。



ISSN 1008-4274

专利文献出版社出版

## 权 利 要 求 书

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1. 一种具有收音机功能的移动电话，包括数字处理单元（201）、液晶显示器（102）、电源（205）、键盘（106）、驱动单元（209）、耳机口（213），其特征在于：还包括收音电路(214)及电路元件。
2. 根据权利要求 1 所述的具有收音机功能的移动电话，其特征在于：所述的驱动单元(209)是双通道的，所述的耳机口(213)是双声道的。
3. 根据权利要求 1 所述的具有收音机功能的移动电话，其特征在于：所述的收音电路(214)与数字处理单元(201)、驱动单元(209)、耳机口(213)相连。
4. 根据权利要求 1 所述的具有收音机功能的移动电话，其特征在于：所述的收音电路(214)以外接耳机的外层屏蔽线作为天线，接收电台信号。
5. 根据权利要求 1 所述的具有收音机功能的移动电话，其特征在于：所述的收音电路(214) 利用移动电话的音频功放电路作为音频功放部分。
6. 根据权利要求 1 所述的具有收音机功能的移动电话，其特征在于：所述的电路元件包括电子调谐器(302)，采用锁相环实现，频率输出由数字处理单元(201)控制。



7. 根据权利要求 1 所述的具有收音机功能的移动电话，其特征在于：所述的收音电路(214)的频率设定由数字处理单元(201)控制，通过自动搜索或直接由键盘(106)输入频率数据来实现；音量由驱动单元(209)中的相关放大器增益决定，是电调节的，由数字处理单元(201)控制；电源控制采用电子开关，由数字处理单元(201)控制通断。





## 说明书

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### 具有收音机功能的移动电话

本发明涉及移动通信类产品，具体涉及一种手持式移动电话。

现有的移动电话是由液晶显示器、数字处理单元、射频单元、数模转换单元、驱动单元、蜂鸣器、麦克风、喇叭、耳机口、键盘、SIM 卡及电源组成的。只向使用者提供电话呼入、呼出业务。虽也提供一些诸如时间显示、电话号码储存等附属功能，但没有提供其他的信息来源，移动电话在大量等候待机时间里闲置未用。

本发明的目的是利用移动电话的数字处理单元、键盘、液晶显示器、驱动单元、耳机接口、电源等部件，再集成收音机接收电路，做成一台方便实用、智能化的数字调谐收音机，接收广播电台信号，使移动电话可以一物多用，充分发挥其作为随身携带品的功效。

为实现上述目的，本发明的具有收音机功能的移动电话包括数字处理单元、液晶显示器、电源、键盘、驱动单元、耳机口、收音电路及电路元件。

所述的驱动单元是双通道的，所述的耳机口是双声道的。所述的收音电路与数字处理单元、驱动单元、耳机口相连。所述的收音电路以外接耳机的外层屏蔽线作为天线，接收电台信号，并利用移动电话的音频功放电路作为音频功放部分。所述的电路元件包括电子调谐器，采用锁相环实现，输出功率由数字处理单元控制。所述的收音电路的频率设定由数字处理单元控制，通过自动搜索或直接从键盘输入频率数据来实现；音量由驱动单元中的相关放大器增益决定，是电调节的，由数字处理单元控制；电源控制采用电子开关，



由数字处理单元控制通断。

本发明的收音电路由于充分利用了普通移动电话的相关部分，如键盘、液晶显示器、数字处理单元、驱动单元、耳机口等，具有完备的键盘输入及良好的界面显示，可灵活设置频率、音量等参数，选台方便准确，智能化程度高，具有普通收音机所不具备的优点。同时，本发明的具有收音机功能的移动电话为用户提供了一条新的信息渠道，如在休闲时听听新闻节目、调频音乐等，一物多用，充分发挥了移动电话作为随身携带品的功效。

下面结合附图对本发明的具体实施方式作进一步详细的描述。

图 1 是普通移动电话的组成框图。

图 2 是本发明的具有收音机功能的移动电话的组成框图。

图 3 是本发明的收音电路与移动电话相应部分的连接图。

图 4 是本发明的收音电路的组成框图。

图 5 是本发明的电子调谐器锁相环路原理图。

图 6 是本发明的一个实施例的收音电路图。

图 7 是本发明的一个实施例的收音电路电子调谐器的锁相环电路图。

图 8 是本发明的一个实施例的收音电路电源控制电路图。

与图 1 不同的是，图 2 增加了收音电路（214），收音电路（214）直接由数字处理单元（201）控制，完成频率设置、音量调节、工作电源控制等操作。收音电路（214）与数字处理单元（201）、驱动单元（209）、耳机口（213）相连，如图 3 所示，收音电路（214）通过四根导线与数字处理单元（201）相连；通过两根导线与驱动单元（209）相连，其中一根接至左声道接口，一根接至右声道接口；通过一根导线与耳机口相连；数字处理单元（201）另有一根导线接到收音电路（214）上实现对收音电路（214）的电源控制。与此相对应，图 8 中，标号 1、



2、3、4 分别表示收音电路 (214) 与数字处理单元 (201) 的四根连接线, 传送相应信号, 其中  $M\_LE$  为输入锁存信号,  $M\_DATA$  为串行输入的控制数据,  $M\_CLK$  为输入时钟,  $M\_LOCK$  为锁相环锁定信号。图 6 中, 标号 5、6 表示收音电路 (214) 与驱动单元 (209) 的连接线, 标号 8 表示收音电路 (214) 与耳机口 (213) 的连接线。图 7 中, 标号 7 表示电源控制电路 (307) 与数字处理单元 (201) 的连接线,

驱动单元 (209) 与普通移动电话的驱动单元 (109) 不同之处在于: 普通移动电话的驱动单元是单通道的, 而驱动单元 (209) 要驱动收音电路 (214) 送来的立体声信号, 有左右两个声道, 是双通道的。同样的道理, 耳机口 (213) 也是双声道的。

图 4 是收音电路 (214) 的构成框图, 该收音电路由带通滤波器 (301、303), 电子调谐器 (302), 限幅放大器 (304), 鉴频器 (305), 解码器 (306), 混频器 (308) 等部件组成, 与一般收音电路不同的是, 收音电路 (214) 增加了电子调谐器 (302), 音频功放部分利用移动电话的音频功放电路。在实施例 1 中, 收音电路 (214) 的高放、混频、中放、限幅放大、鉴频和立体声解码等全部功能是由一个 IC 来实现的。

整个收音电路的电源 ( $V_{FM}$ ) 受数字处理单元 (201) 控制, 当启动收音电路 (214) 时, 来自电源 (205) 的电压  $V_{BB}$  直通电源控制电路 (307), 给收音电路提供电源 ( $V_{FM}$ )。而不收听广播时, 则切断整个收音电路的供电, 以降低移动电话的整机功耗。

收音电路 (214) 以移动电话的耳机线作为天线, 接收广播电台信号。天线接收的电台信号经收音电路 (214) 鉴频解调成音频信号后, 送入驱动单元 (209) 进行幅度及功率放大, 再送往耳机口 (213)。



具体过程如图 4 所示，外接耳机的外层屏蔽线兼作天线接收电台信号，电台信号经天线进入带通滤波器（301）去除带外信号后，经缓冲放大后与电子调谐器（302）生成的本振信号通过混频器（308）进行混频形成中频信号，经带通滤波器（303）滤波后再缓冲放大，送入限幅放大器（304）进行限幅放大，输出幅度一致但频率变化的中频信号，送入鉴频器（305）鉴频，经缓冲放大后送入解码器（306）解调出调频立体声，解码输出的信号（分为左、右两个声道）送往图（2）所示的驱动单元（209），然后送往耳机口（213）。

电子调谐器（302）完成选台操作，用锁相环实现，由数字处理单元（201）控制，根据不同的频道设定不同的本振频率。图 5 是电子调谐器（302）的锁相环路工作原理图。由数字处理单元控制输入锁相环的数字串行含有 CLK（时钟）、DATA（分频数）、LE（锁存）信号，锁相环的锁定状态（LOCK）输出到数字处理单元（201）以判定是否锁定在预定的频率。锁相环的本振参考频率由锁相环本振电路与外接  $9.6\text{MHz}$  晶体产生，再由锁相环内部分频成  $75\text{kHz}$  的基准频率，送往混频器（308）。

收音机的频率设定分为两个步骤：第一步，首先要预选频道，可采用自动搜索或直接由键盘输入频率数据两种方法。自动搜索的操作如下：通过按键进入移动电话显示器显示的“收音功能|频率设定|自动搜索”菜单后，移动电话开始从最低频率点（ $88\text{MHz}$ ）以  $75\text{kHz}$  为步进开始扫描，当收到的信号场强超过临界值时，停止扫描，提醒是否存储。若用户输入“否认”键，则继续扫描；若用户输入“确认”键，则要求用户继续输入频率代号。用户通过键盘输入频率代号后，移动电话保存此频率，并开始下一信道的扫描。如此继续，直到扫描的调频电台频率最高点（ $108\text{MHz}$ ）为止。这样，可以存有可能所有预选的电台频率。若知道电台的频率值，也可直接输入，操作



如下：进入“收音功能|频率设定|手工输入”菜单，先输入频率值，接着输入频率代号，则此频率就保存在手机中，今后以此代号作为相应的电台代号。第二步，收听电台时，只须选定预定的电台代号即可。具体操作如下：进入“收音功能|选台”菜单，输入电台代号或通过上、下键循环进行选择。

在收听电台时，由于采用耳机输出，音量的设定不需要在收听时经常调整。音量的设定方法与通话音量设置相似：进入“系统设置|音量控制|收音”菜单，通过上、下键步进调节。

收音电路（214）平时处于停机状态，当数字处理单元（201）打开收音电路的电源开关，并设置频率后，收音电路开始工作。收音电路稳定工作过程中不占用数字处理单元的处理能力，移动电话仍可接收呼入信号并以蜂鸣器提醒用户。主叫呼出时，如采用耳机接口进行通话，会引起电台信号与对方语音信号的叠加，但这种效果在某些情况下或许也是用户所需要的，譬如以电台的音乐作为背景音响；如果要消除这种情况，只需采用喇叭收听对方语音，或者通过键盘操作切断驱动单元收音驱动电路部分的输出即可。

下面结合图 6、图 7、图 8 对本发明的一个具体的实施例进行说明。其中 1 是 CXA1238S IC，2 是 VCO 电路，3 是调谐放大电路，4 是数字调谐控制 IC MB1504，5 是 P 沟道 MOS 管 MTD2955。

图 6 是本发明的一个实施例的收音电路图。与图 3 相对应，在这个电路中选择 SONY 公司生产的 CXA1238S IC 接受信号和解码，集中实现高放、混频、中放、限幅放大、鉴频和立体声解码等全部功能，灵敏度高、噪声低、失真小、耗电省。射频信号 RF\_IN 来自于外接耳机的屏蔽线的感应，经 CXA1238S 解调输出为 R 和 L 两个声道，输出到驱动单元（209）进行幅度及功率放大，然后输出到外接耳机上。

压控变容二极管 VD2、VD3 等器件组成 VCO 电路，提供本振信号，同时调谐放大电路也由压控变容二极管 VD4、VD5 等器件组成，其控制信号 VT 来自锁相环 MB1504。

图 6 即为本发明的一个实施例的电子调谐器锁相环电路，在此电路选用 FUJITSU 公司的 MB1504 作为数字调谐控制 IC，此 IC 为单锁相环（PLL），工作电压低，功耗小。本振信号经缓冲后形成 FM\_OSC 信号送往锁相环，经分频成 25kHz 信号送往锁相环内的相位比较器，与 9.6MHz 本振信号分频后形成的 25kHz 信号进行相位比较，输出的误差信号 DO 经阻容电路低通滤波后，变成直流控制电压 VT，用来控制 VCO（即收音电路的本振回路）的振荡频率，使 VCO 输出频率为预定值。锁相环锁定信号 M\_LOCK 输出到数字处理单元（201），表示锁相环是否锁定。VCO 本振频率的分频系数和晶振 Y2 参考频率的分频系数由数字处理单元（201）通过 M\_CLK、M\_DATA、M\_LE 控制信号设置。

本发明实施例的电源控制电路（307）由一个 P 沟道 MOS 管 MTD2955 构成，与数字处理单元（201）相连接，如图 7 所示。数字处理单元（201）的输出信号 M\_PWR 控制电源控制电路的通断，当 M\_PWR 为高电平时，MTD2955 截止， $V_{FM}$  不提供电流，当 M\_PWR 为低电平时，MTD2955 导通， $V_{BB}$  提供电流直通到  $V_{FM}$ ，为整个收音电路提供能量。

频率、音量设置等具体操作如前所述，在此不再描述。

## 说明书附图

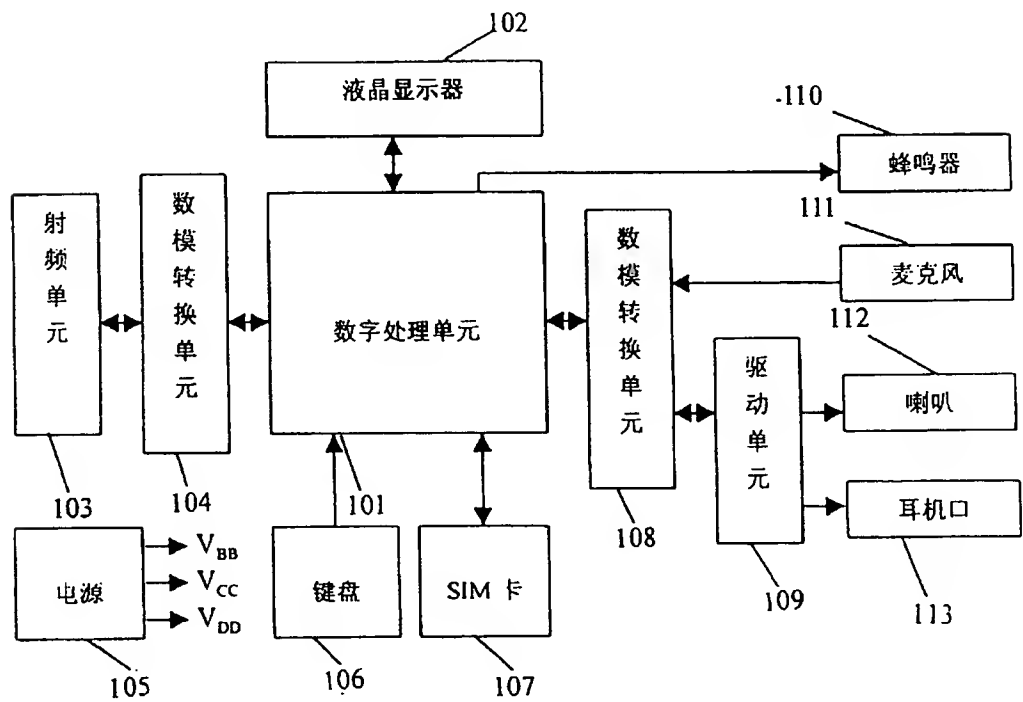


图 1

98.10.12

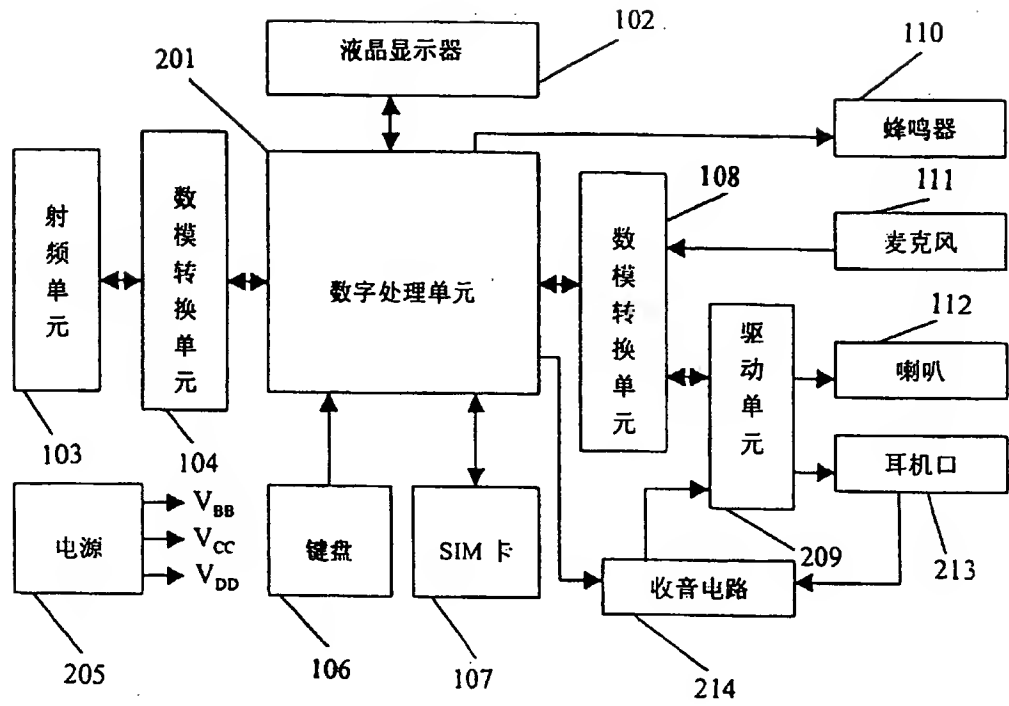


图 2



98.10.12

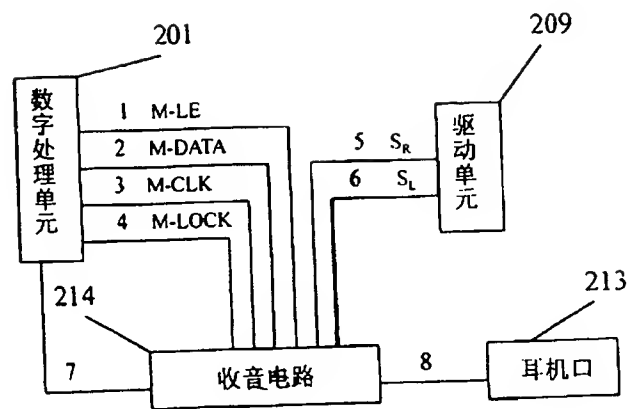


图 3

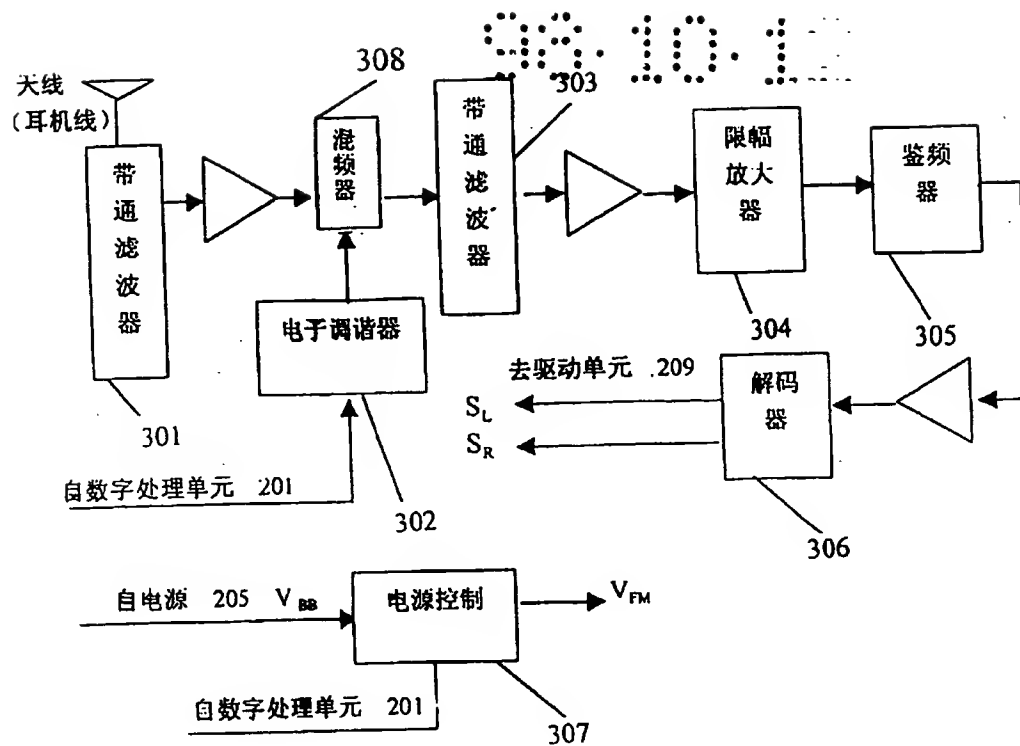


图 4

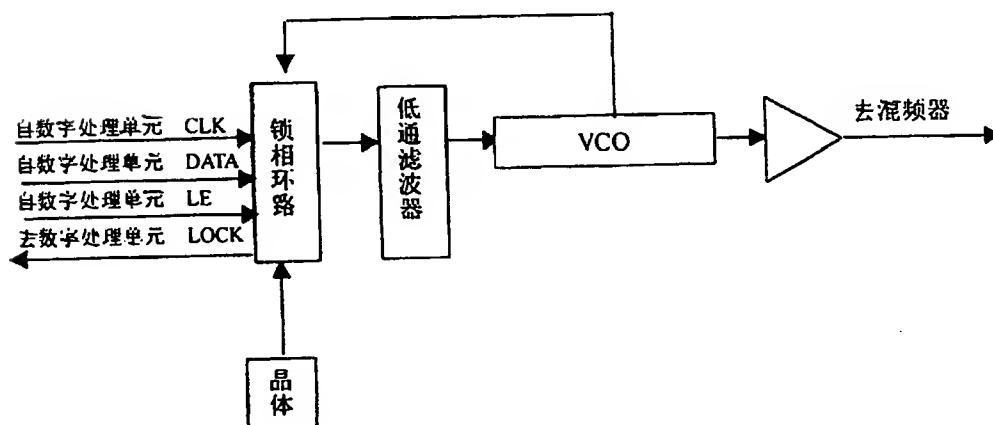


图 5

08.10.12

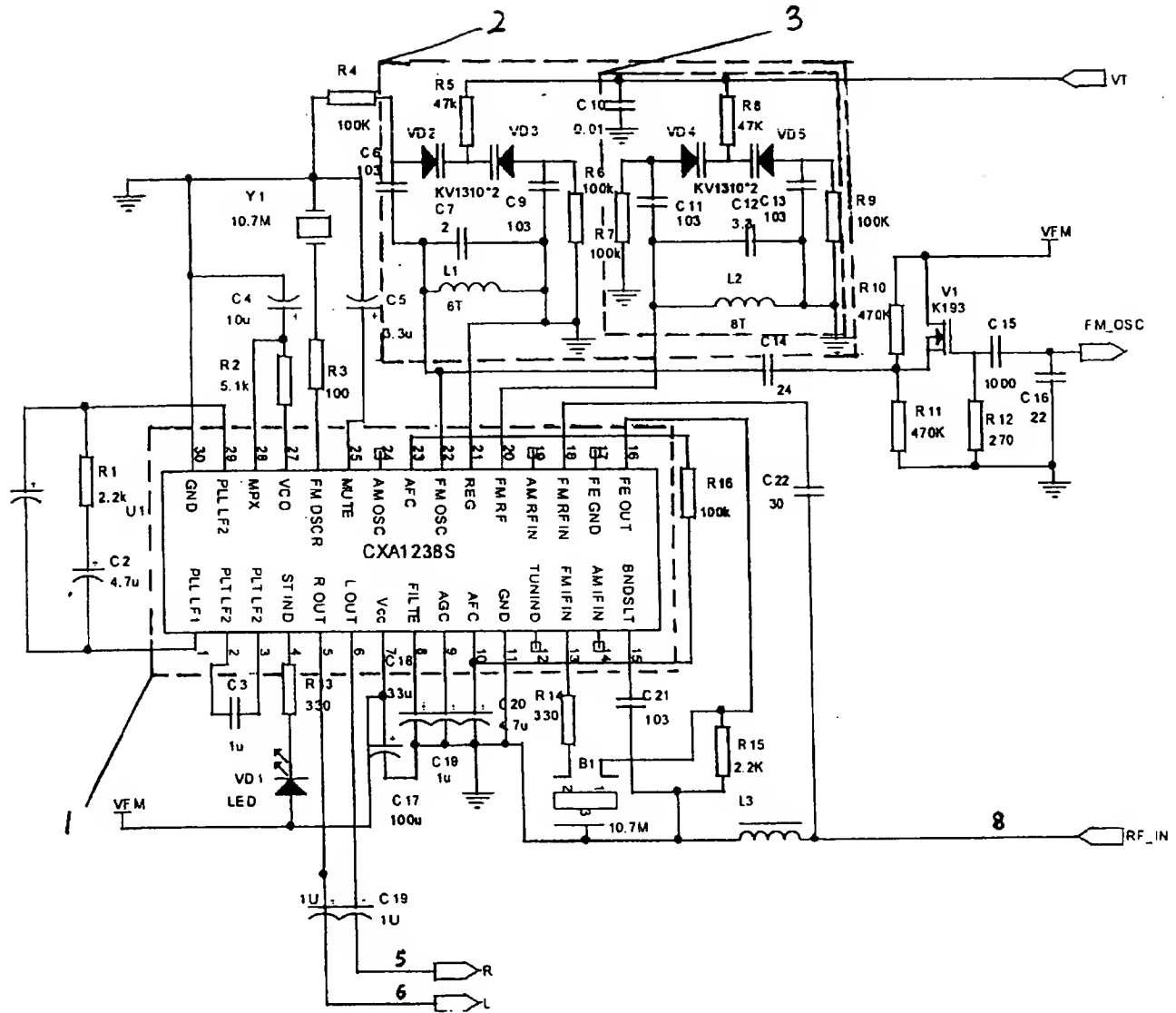


图 6

98.10.10

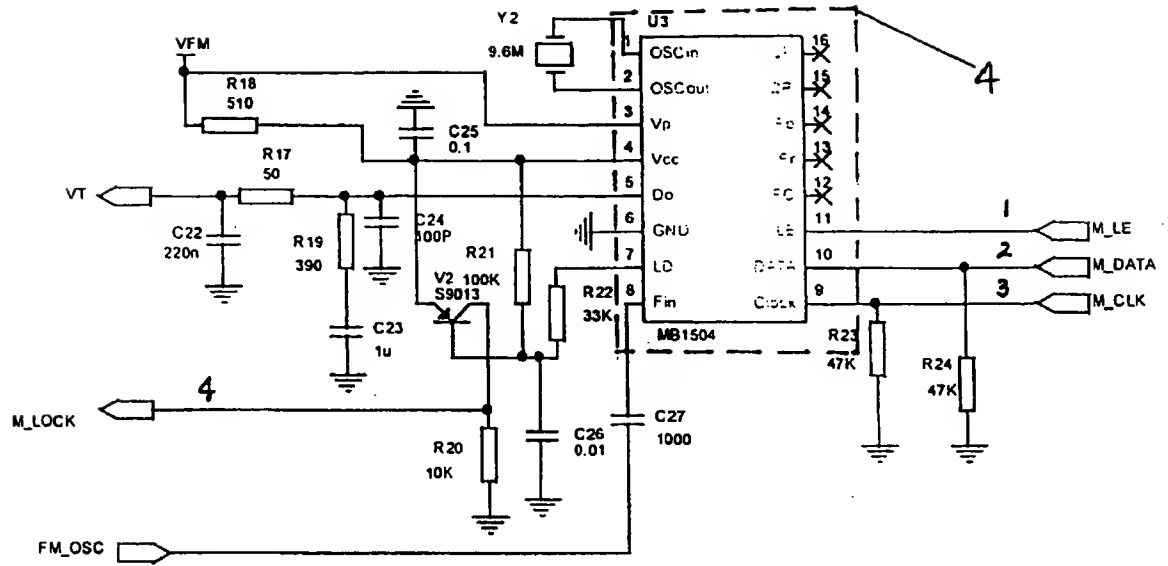


图 7

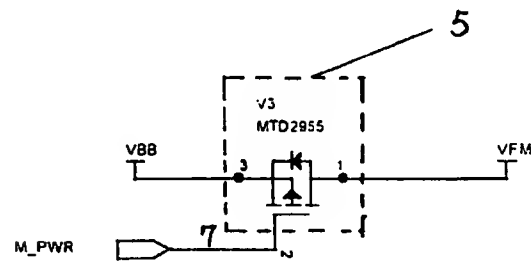


图 8